



# Risk factors for postoperative complications and long-term survival in lung cancer patients older than 80 years

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Concomitantly with worldwide population aging, the incidence of lung cancer has been gradually increasing, especially in octogenarian patients (1,2). Because of the physiology and functional status of octogenarians, choosing the most suitable treatment strategy for them is an issue of particular concern. In 1989, Shirakusa and colleagues reported favorable outcomes in octogenarian lung cancer patients who underwent surgical resection from 1978 to 1987 (3). Since then, numerous studies have investigated lung cancer surgery in octogenarians, seeking to identify criteria that can predict the prognosis of octogenarian patients in terms of long-term outcomes and postoperative complications.

Hino and colleagues recently published an article entitled “Risk factors for postoperative complications and long-term survival in lung cancer patients older than 80 years” in the *European Journal of Cardio-Thoracic Surgery* (4). They conducted a multi-institutional analysis in Japan from January 1998 to December 2015. In this study, 337 octogenarian patients were included, with a median age of 82 years. The postoperative complication and mortality rates were 35.3% and 1.8%, respectively. Univariate and multivariate analyses showed that the risk factors for postoperative complications were male sex and operation time, whereas the predictive factors affecting long-term survival were male sex, Charlson Comorbidity Index (CCI),

Glasgow Prognostic Score (GPS), and the pathologic stage of the tumor. They suggested that those factors should be considered when determining the optimal management for patients older than 80 years with lung cancer who undergo surgery.

In the past, the rates of life-threatening complications and postoperative complications in octogenarian patients were reported to range from 2.4% to 4.8% and from 20% to 40% in literature reviews (1,5-9). In 2018, Pagès and colleagues reported a comparison of outcomes between younger patients (<80 years) and octogenarians who underwent lung surgery using the French Administrative Database. In their study 4,438 octogenarian patients were included. The mortality rate in octogenarians was 7.77%, compared to 3.54% in younger patients. In their logistic model, age  $\geq 80$  years, a CCI score  $\geq 3$ , and the comorbidities of liver disease, pulmonary disease, hematological disease, kidney disease, and neurological disease were associated with in-hospital mortality (10).

In another study using the Dutch Lung Surgery nationwide database, 2,133 octogenarian patients were analyzed by Detillon and Veen. They reported an overall postoperative complication rate of 29.9%, with no significant differences among the three age groups (60–69, 70–79, and over 80), and an overall mortality rate of 2.1%. However, the mortality rate in octogenarians was 6.0%,

significantly higher than in younger patients. Univariate and multivariate analyses showed that age  $\geq 80$  years, a low forced expiratory volume at 1 second (FEV<sub>1</sub>), a high Eastern Cooperative Oncology Group (ECOG) performance status score, and congestive heart failure were significant risk factors associated with perioperative mortality (11).

Miura *et al.* reported long-term outcomes in a retrospective cohort of octogenarians who underwent lung cancer surgery. They demonstrated an overall survival of 79.6% and 53.1% at 3 and 5 years, respectively. The risk factors associated with mortality were a high American Society of Anesthesiologists classification score and a past history of myocardial infarction, congestive heart failure, and/or diabetes mellitus with end-organ damage (12). Another study reported by Dominguez-Ventura and colleagues showed overall 1-, 2-, and 5-year survival rates in patients  $\geq 80$  years of age following pulmonary resection for lung cancer of 80%, 62%, and 34%, respectively (13). In the study by Hino and colleagues, the 5-year overall and recurrence-free survival rates were 66.1% and 60.3%, respectively. Their results were comparable to previous studies.

Stereotactic body radiotherapy (SBRT) has emerged as an alternative to surgical treatment for lung cancer in octogenarians with favorable outcomes. However, a comparison between surgery and SBRT remains difficult because of the limited number of randomized controlled trials, especially in octogenarian patients. Kreinbrink reported that local control was achieved in 100% and 92.3% of octogenarian lung cancer patients at 1 and 2 years after SBRT, respectively. The median survival was 29.1 months. There were no cases of grades 2–5 toxicity. The cases of grade 1 toxicity in their study included fatigue in 5 patients (16.1%), asymptomatic (radiographic) pneumonitis in 12 patients (38.7%), and dyspnea in 2 patients (6.5%) (14). In contrast with the previous result, a systematic review was conducted by Li and colleagues, comparing SBRT and surgery in patients with T1-3N0M0 lung cancer. In their study, SBRT was associated with a significantly worse 5-year overall survival rate and recurrence-free survival rate than surgery (15). Moreover, the European Society for Medical Oncology clinical guidelines still recommend SBRT as the first-line treatment in non-operable patients (16).

In the article by Hino and colleagues, there were limitations including selection bias and the lack of a comparative analysis between octogenarians and younger groups. However, the authors are already taking steps to

remedy this issue through further research.

In conclusion, the treatment strategy for octogenarian lung cancer patients should be decided by multidisciplinary teams. Surgical treatment for early lung cancer in low-risk octogenarian patients remains the first-line treatment. However, a randomized controlled study should be conducted of SBRT and surgical treatment in high-comorbidity octogenarian patients, such as those with a high CCI or GPS, to determine which option is best for such patients.

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## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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